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ENTOMOLOGICAL OBSERVATIONS ON FANNING AND WASHINGTON ISLANDS, TOGETHER WITH GENERAL BIOLOGICAL NOTES

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The equatorial coral islands of the mid-Pacific Ocean offer much of interest to the biologist. They are for the most part unstudied biologically, being off the main routes of travel and generally more or less difficult to approach. The rather isolated group with which we are concerned in this paper consists of the following small islands: Christmas, nearest the equator, Fanning, Washington and Palmyra, extending from Lat. 1° 57′ to 5° 49′ North and Long. 157° 27′ to 162° 11′ West. With the exception of the latter, this group is governmentally a part of the Gilbert and Ellice Islands (British), and the inhabitants are mainly Gilbertese.

The group was visited by the writer during the summer of 1924, and the voyage was made on a copra vessel, a small British motor schooner, under sail practically the entire distance from San Francisco to Fanning Island. The trip required twenty-three days. The stay on the islands lasted about three months, very largely on Fanning, affording an unusual opportunity for the study of its fauna and flora. On the return trip the Hawaiian Islands were visited, adding much to the value of the investigation because of the opportunity to compare certain material in hand with collections in Honolulu, both from the Hawaiian Islands and the Society Islands, about midway between which the islands under consideration are situated, i. e., separated from these groups by distances of from about 850 to 1200 miles.

Fanning Island is a typical coral atoll, consisting of a narrow rim of land hardly three-fourths of a mile wide at the most and enclosing a very beautiful lagoon, opening into the ocean at three points, thus forming in reality a circle of three narrow islands. The entire island is approximately ten and one-half miles long by five and one-half miles wide, with an external

circumference of about thirty-one miles. It comprises about 8500 acres, of which over 3200 acres are in coconuts. Washington Island is about four and one-half miles in length by one and one-half miles wide, with an external circumference of about ten miles. This island encloses a shallow fresh-water lake about two miles long, with an average width of about half a mile. The highest elevation of either of these islands is not over twelve feet. Since practically all of our collecting was done on these two islands, a description of the other islands will be omitted.

The total annual rainfall for Fanning Island for 1918 was slightly over 102 inches, for 1923 it was slightly over 66 inches, and for the first eight months of 1924 it was above 55 inches. The temperature ranges from about 78° F. at night to about 85° F. at noon, with very little variation throughout the year, except an occasional day when more than 90° F., or a night when 70° F. may be reached. The annual mean temperature is slightly in excess of 81° F. The humidity is seldom below 70.

As might be expected, the flora of these coral islands is very meager in species, although the vegetation in some places presents tropical luxuriance, notably on Washington and Palmyra Islands. The writer and an assistant collected forty-six out of the fifty-four known species of plants from this group of islands, only two small collections having been made previously. Of this total number of species, eleven have been introduced purposely, among them *Cocos nucifera* Linn., *Musa sapientum* Linn., *Artocarpus communis* Forst., *Carica papaya* Linn., and *Hibiscus rosa-sinensis* Linn. Fourteen species have been accidentally introduced, among them *Euphorbia hirta* Linn., *Euphorbia prostrata* Ait., *Sida fallax* Walp and *Vernonia cinerea* Less.

According to Dean E. D. Merrill, who identified all the species collected by the writer, about twenty-nine may safely be considered as native species. Most of the bush, which in some places forms almost impenetrable thickets, consists of such native species as the Umbrella (*Tournefortia argentea* Linn. f.), which may reach the height of great trees, Buka (*Pisonia grandis* R. Br.), also occasionally occurring as tall trees, and Nashu (*Scœvola kœnigi* Krause). The screw pine (*Pandanus tectorius* Sol.) is also a conspicuous part of the vegetation in

some parts of the islands. The coconut, however, dominates all, and is never out of sight.

With this rather poor flora as a basis for support, the number of species of insects dependent directly or indirectly on plant food is naturally not very great, but the paucity in the number of species is generally well balanced by the abundance of individuals in a given species, notably ants. The same thing may be said relative to the fauna in general. The number of species of native birds is relatively small, there being only thirteen species on these islands (eleven sea birds, and two land birds) exclusive of migrants. The number of individuals is, however, very great and at times the sky is literally clouded with birds, almost wholly fish-eating. The noddy tern (*Anous stolidus*) is most numerous, and three species of boobies (*Sula leucogastra, Sula dactylatra* and *Sula piscator*) occur in abundance, while the booby's arch-enemy, the man-o'-war hawk or frigate bird (*Fregata minor palmerstoni* is ever present. A rare species of paraquet (*Vinus kühlü*), a most exquisite creature is rapidly growing less in numbers, though still fairly abundant. The very beautiful tropic bird or bo's'n bird (two species, *Phœthon lepturus* and *Phœthon rubricauda*) is fairly common in this region.

The ground almost everywhere is full of crab holes, and as one approaches these, the ludicrous omnivorous land crab (*Cardisoma obesum*) sidles away and disappears in its burrow. Hermit crabs (*Cœnobita rugosa*) are exceedingly abundant and pestiferous, apparently attacking almost anything. The so-called coconut crab (*Birgus latro*), a large and powerful species, is rapidly becoming extinct, but may still be seen climbing coconut trees at night, hiding in holes in the ground and cavities of trees during the day. Two species each of gheckos and skinks, usually measuring not over five or six inches in length, are remarkably abundant, and their rather large, white eggs are frequently encountered in pockets in the rough trunks of the coconut trees and elsewhere.

Rats (*Epimys alexandrinus*) are very numerous and a serious pest to the coconut industry.

During the practically three months' stay on these islands much time was given to the study of coconut pests, particularly the Tahiti coconut weevil (*Diocalandra taitensis* Guerin). Rela-

tively little time remained for much else, however, spare hours were diligently spent in making collections. Although many insects were collected and safely brought to Berkeley in pill-boxes, the total number of species taken is quite disappointingly small, namely, only about ninety.

These ninety species are distributed somewhat as follows, with probable corrections after all the material has been carefully checked up:

Coleoptera, 31 species, included in the following families: Staphylinidæ (2), Hydrophilidæ (1), Cleridæ, (1), Nitidulidæ (1), Cucujidæ (2), Dermestidæ (1), Cryptophagidæ (1), Ostomidæ (1), Coccinellidæ (1), Elateridæ (3), Odomeridæ (4), Tenebrionidæ (3), Scarabæidæ (1), Cerambycidæ (1), Anthribidæ (1), Curculionidæ (5), Scolytidæ (2).

Diptera, 12 species, included in the following families: Culicidæ (2), Tipulidæ (2), Dolichopodidæ (2), Ortalidæ (1), Sarcophagidæ (1), Muscidæ (1), Calliphoridæ (2), Hippoboscidæ (1).

Hymenoptera, 10 species in the following families: Apidæ (1), Formicidæ (7), Evaniidæ (1), Chalcididæ (1).

Hemiptera, 8 species in the following families: Pentatomidæ (1), Cydnidæ (1), Miridæ (1), Nabidæ (1), Coccidæ (4).

Orthoptera, 8 species in the following families: Blattidæ (5), Tettigoniidæ (1), Gryllidæ (1), Forficulidæ (1).

Lepidoptera, 7 species in the following families: Noctuidæ (4), Sphingidæ (1), Nymphalidæ (2).

Isoptera, 2 species.

Mallophaga, 3 species.

Anoplura, 1 species.

Odonata, 3 species.

Thysanura, 2 species.

BUTTERFLIES

Although one specimen of the milkweed butterfly (*Danaus archippus*), taken on Fanning Island, appears in my collection, the specimen having been given to my assistant, Mr. Kirby, by a native, none was actually seen by either of us, and the presence of this one specimen is rather puzzling. On the other hand, the beautiful *Hypolimnas bolina* Linn. occurs rather abundantly, though restricted in range, in certain localities on Fanning. I took all three color phases during my stay on this island. So

far as I know, the sole food plant of the larvæ on this island is *Sida fallax* Walp, an accidentally introduced weed called "kaura" by the native Gilbertese.

The natives were greatly impressed by the fact that the writer reared in his room the beautiful "tebuba" (butterfly) from the ugly "worm" which feeds on the "kaura." Although I do not know how long the larval period is, the pupal period is quite short, for example, two caterpillars pupated Sunday, June 8 (1924), between 8:45 a. m. and 9 a. m., and emerged early Monday morning, June 16, giving a pupal period of eight days. The type locality for this species is the Indo-Malayan region. It occurs in Madagascar and western China.

MOSQUITOES

Mosquitoes (*Aedes*) were very abundant and annoying on Washington Island where they breed primarily in the rain receptacles, from which the water is taken for drinking and general domestic purposes. The natives dig shallow water holes, "temanipa," in which mosquitoes (*Culex*) breed in enormous numbers, particularly on Fanning, where these water holes are of frequent occurrence.

HEAD LICE

Head lice (*Pediculus capitis*) are very abundant among the native Gilbertese. These lice are distinctly brownish black in color, as may be seen from the specimens taken from natives on Fanning Island. The lice are considered a delicacy by the natives. If it were not so disgusting, I might go into considerable detail to describe the instances in which I witnessed the evidently joyous tête-a-têtes in which this form of delousing was in progress.

TERMITES

Two species of termites were taken on Fanning Island, namely, *Kalotermes immigrans* Snyder, a Hawaiian species, and *Cryptotermes hermsi* sp. nov. (named by Kirby[1]). Only one nest of the former was found in which these insects were tunneling in the hard wood of a prostrate log of Tournefortia, the Umbrella tree. The second species was common and abundant in decayed logs and stumps of coconut and Tournefortia.

Cryptotermes hermsi Kirby is a close relative of the Oriental

1 Kirby, Jr., Harold, 1925. Cryptotermes hermsi sp. nov., a termite from Fanning Island. University of California Publications in Zoölogy, Vol. 26, No. 23, pp. 437-441. Twelve figures in text.

termites and is interesting because of its occurrence on Fanning and its absence both from the Hawaiian Islands and Australia, with which Fanning Island has maritime contact. This species is said to differ markedly from *Cryptotermes primus* Hill of Australia, and even more decidedly from *Cryptotermes piceatus* Snyder of the Hawaiian Islands. It is closely related to *Cryptotermes kotoensis* Oshima, an Oriental species.

BLISTERING BEETLES

Shortly after boarding the vessel which was to take me to Fanning Island, I was told about a beetle which blisters on contact, and is very common. Not long after my arrival I learned from experience that this was the case. Myriads of individuals of two species of *Sessinia* swarm about the newly opened male flowers of the coconut, feeding on pollen. These two species are *Sessinia collaris* (Shp.) and *Sessinia decolor* Fairm., both of which are locally called coconut beetles. Both of these species were readily attracted by a strong electric light, which was led from the ship to the land for the purpose of collecting insects. *Sessinia decolor* certainly causes severe blistering if, for example, it is slapped when crawling on the forearm while collecting specimens. A specimen came in contact with my forearm on the evening of May 20 (1924) and was rather lightly brushed away, but the following day a large blister appeared, measuring about three-quarters of an inch in length by one-quarter inch in breadth, considerably elevated and filled with clear liquid. I opened the blister and applied iodine. The blister did not cause any appreciable pain.

A more detailed study of the species of insects taken on these islands is in progress and will be published shortly, together with observations concerning their geographical distribution.

NOTE ON OPUNTIA INSECTS

Doctor H. G. Dyar has just indicated the identity of "Melitara sp.," page 5, Vol II, this journal. For this form the name, *bollii* Zeller, is available, but Doctor Dyar considers it advisable to treat it as a variety of the Florida *prodenialis* Walker. The Florida form is, then, *Melitara prodenialis prodenialis* Walker, while the Texan "Melitara sp." is *Melitara prodenialis bollii* Zeller.—J. C. Hamlin.

NOTES ON SOME CENTIPEDS AND MILLIPEDS FROM UTAH

BY RALPH V. CHAMBERLIN

The centipeds and millipeds noticed in this paper were collected mostly by the writer during the spring of 1924, the greater portion of them coming from Washington County and adjacent parts of southwestern Utah. To these were added specimens collected in the same region by Mr. V. M. Tanner, to whom I wish here to express my thanks. In addition to the material from southern Utah, the paper deals also with some forms taken by myself farther north, chiefly in Salt Lake and Cache Counties, Utah.

CHILOPODA

Oabius paiutus Chamberlin, sp. nov.

Brown to yellow, the head and posterior legs tending to have an orange tinge. Antennæ short; composed of twenty articles. Ocelli five or six, in two series, the single ocellus enlarged. Ventral spines of first legs, 0, 0, 0, 2, 1-0, 0, 1, 1 (2), 1. Dorsal spines of twelfth legs, 0, 0, 3, 1, 1. Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 2, 3, 2; claws, 2. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0; claw single. None of the coxæ laterally armed. Claw of gonopods of female tripartite, but the outer lobe almost obliterated, the claw for the most part appearing essentially bipartite, the lobes short; basal spines, 2 + 2. Anal legs of male unmodified. Length, up to 7 mm.

Locality. **Utah: Parowan Canyon.** May, 1924. Many specimens.

Tidabius zionicus Chamberlin, sp. nov.

Agrees with *To. bonvillensis* Chamb. and differs from other species of the genus in having the basal spines of the female gonopods 3 + 3. It differs from *bonvillensis* in having only two claws on the anal legs instead of three. Articles of antennæ up to thirty, mostly very short. Ocelli few, in two series. Third article of first four pairs of legs unarmed ventrally. Ventral spines of anal legs, 0, 1, 3, 2, 0. Dorsal spines of penult legs, 0, 0, 3, 1, 0. Length, up to 8.25 mm.

Locality. **Utah: Zion National Park.** May, 1924.

Lophobius loganus Chamberlin, sp. nov.

Dorsum yellowish brown; head more orange anteriorly. Legs yellow, the caudal pair of an orange tinge. Ocelli eleven, in three series; e. g., 1 + 2, 5, 3. Ventral spines of first legs, 0, 0, 2, 3, 2. Dorsal spines of twelfth legs, 0, 0, 3, 1, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1. Dorsal spines of anal legs 1, 0, 3, 1, 0; ventral, 0, 1, 3, 2, 0; the claw unarmed. Last three pairs of

coxæ dorsally armed; only the last coxæ laterally armed. In the male the anal legs have the last joint furrowed along the mesal side, as in the next species; the fourth joint is also similarly modified, bearing a dorsal lobe at distal end, its mesal surface broadly furrowed, also furrowed along ectal surface above. Length, 12 mm.

Locality. **Logan Canyon, Cache County, Utah.** One male and two smaller females.

Nearly related to *L. franciscæ,* but differing decidedly in color, in being broader behind and thus more attenuated cephalad, in having only the last coxæ laterally armed, in having the ventral spines of anal legs, 0, 1, 3, 2, 0 instead of 0, 1, 3, 2, 1, etc.

Lophobius franciscæ Chamberlin, sp. nov.

Allied to *L. collium* (Chamberlin). It differs from that species obviously, in being reddish or chestnut instead of yellow or orange. It differs from that species also, in having the ventral spines of the anal legs normally 0, 1, 3, 2, 1, instead of 0, 1, 3, 2, 0, though the latter formula may occasionally hold; also in having only the last two instead of the last three coxæ laterally armed. Antennæ normally with twenty articles, but varying up to twenty-six, the number tending to differ in such cases on the two sides. Basal spines of female gonopods, 2 + 2 or 3 + 3. In the anal legs of both sexes the last article is furrowed along the mesal side. In the anal leg of male the fourth article is conspicuously thickened and is broadly furrowed or excavated on mesal side, the excavation limited above by a ridge-like margin somewhat as in *collium*; at the distal end, above a conspicuous process or lobe. Length, 13 mm.

Locality. **Cedar City, Utah.** May, 1924.

Named for Mrs. Frances (Brown) Chamberlin.

POKABIUS UTAHENSIS (Chamberlin)

Localities. Utah: Bear Lake. Many females. Also Logan Canyon. Many specimens, both males and females, but the females much predominating.

A form abundant under damp leaves in shaded places along canyon streams in the northern part of the State.

LITHOBIUS FORFICATUS Linne

Locality. Utah: San Pete County, Fairview. Many specimens.

This introduced species has become common about settlements in the more northern part of the State.

GOSIBIUS ARIZONENSIS Chamberlin

Localities. Parowan and Cedar Canyons. May. Only males secured.

The specimens agree closely with Arizona individuals, though

apparently somewhat smaller. The spines of the anal legs in one adult male 0, 1, 3, 3, 1 instead of 0, 1, 3, 2, 1.

Ethopolys parowanus Chamberlin, sp. nov.

Related to *E. bipunctatus* (Wood), occurring in northern Utah and in Nevada, in having none of the dorsal plates produced. It is a smaller form with shorter antennæ. It differs in having only one tooth ectad of the prosternal spine, the usual formulæ being from 1—4+4—1 to 1—6+6—1. It is also characterized by having the claw of the female gonopods entire, or essentially so, instead of tripartite; basal spines in adults 3, 3, more rarely 2 + 3 or 2 + 2. Ventral spines of anal legs, 1, 1, 3, 2, 0 or 1, 1, 3, 2, 1, the claw single. Ventral spines of penult legs, 1, 1, 3, 3, 2; dorsal spines, 1, 0, 3, 1, 1; claws, three. Length, 21 mm.

Localities. **Utah: Parowan;** also Cedar City. April and May. Many specimens.

BOTHROPOLYS PERMUNDUS Chamberlin

Localities. Utah: Mill Creek Canyon, Logan Canyon, Bear Lake.

Many specimens of this species were taken in each of these localities. It is one of the most common chilopods of the Wahsatch Mountains.

Kethops leioceps Chamberlin, sp. nov.

Differs from *K. utahensis,* the genotype, in wholly lacking both the paired and the unpaired sulci on cephalic plate. First dorsal plate similar, in having a cervical sulcus and paired sulci that branch and together form a W behind the cervical sulcus. Last dorsal plate wider at caudal than at anterior end, its caudal margin convexly bowed out in the middle, not emarginate. Last ventral plate strongly narrowed caudad. Coxopleuræ with caudal process short; scattered short spines. The anal legs in general form as in *utahensis;* the joints broad but not furrowed ventrally; femur with a median ventral area free from spines, toward mesal side of ventral surface a series of four stout spines or teeth. Tibia also with a series of four ventral teeth. Metatarsus with a ventral series of close-set teeth, not with an edge excised at middle as in *utahensis.* Length, 24 mm.

Locality. **Utah: Mill Creek Canyon.** One specimen.

THEATOPS POSTICUS (Say)

Locality. Utah: Washington County. May. One specimen.

This species is very common in the Southeastern States, but has not been known previously from the West.

OTOCRYPTOPS SEXSPINOSUS (Say)

Locality. Utah: Zion National Park. May. One young specimen.

There is little doubt that the specimen is correctly referred, although the margination of the head is obscure. The species is common, both in the Eastern and Southeastern States and on the Pacific Coast.

SCOLOPENDRA POLYMORPHA Wood

Localities. Utah: Washington, St. George and Zion National Park. April and May, 1924.

This species ranges northward in the State as far as Salt Lake City. The Utah specimens are dwarfed, in comparison with those found in Arizona and southern California.

Scolopendra utahana Chamberlin, sp. nov.

Head without longitudinal sulci, smooth and shining, obscurely finely punctate. Antennæ short; articles twenty, of which only the first four are nearly glabrous. First dorsal plate with a strongly marked cervical sulcus like that of *S. polymorpha;* without longitudinal sulci. Last dorsal plate short and broad; with a fine median longitudinal impressed line. Dental plates of prosternum each with four teeth, of which the three innermost are united at base. Anal legs short; femur short and thick with about fifteen seriate spines ventrally, none on mesal surface except the series of five teeth along dorso-mesal edge; process at dorso-distal corner bearing only two teeth, which are long. Length, 45 mm.

Locality. **Utah: Zion National Park.** May.

Resembles *S. polymorpha* Wood, but readily distinguished, in having only the first four articles of antennæ glabrous instead of eight or more, in having the distal process of femora of anal legs with only two spines, and in having the mesal surface of femora free from spines.

Nyctunguis molinor Chamberlin, sp. nov.

Body yellow, near orange, the middle and posterior segments also of an orange or red tinge. The cephalic plate longer than wide, longer than in *libercolens,* a species it resembles; widest in front of middle from where more strongly narrowed caudad than cephalad; anterior margin forming an obtuse angle. Prebasal plate exposed. All joints of prehensors unarmed; claws when closed failing considerably of attaining the front margin of head. Labrum wide, somewhat as in *libercolens,* but the median arc deeper and shorter, the teeth proportionately larger and fewer, typically ten in number. Ventral pores present on anterior plates, forming a small circular area on each plate. Last ventral plate broadly trapeziform, not strongly narrowed caudad. The coxal pores two on each side, homogenous, the anterior one covered by last ventral plate, the posterior one partly covered; posterior gland much larger than the anterior one. Pairs of legs, 47 (♂), 49 (♀). Length, 17 mm.

Locality. **Utah**: At mouth of **Mill Creek Canyon.** One male and one female. May.

Geophilus shoshoneus Chamberlin, sp. nov.

A species resembling the Eastern *G. mordax,* but a much smaller form, easily distinguished in not having the prebasal plate exposed, the cephalic plate extending well over it. Claws of prehensors, when closed, attaining anterior margin of head. Prosternum and joints of prehensors unarmed. Chitinous lines present on prosternum, fine. Antennæ short. Ventral pores of sternites numerous, forming a transverse band broadest at middle in front of posterior margin. Last ventral plate wide, the posterior margin a little indented at middle. Coxal pores four or five on each side close to margin of plate, with no isolated single pore such as is characteristic of *mordax.* Pairs of legs, 55-57. Length, 20 mm.

Locality. **Utah: Logan Canyon** and on the divide between this canyon and Bear Lake Valley. Two specimens.

GEOPHILUS RUBENS Say

Locality. Utah: Washington County. Three specimens. May.

A species also met with frequently in Arizona. The Utah specimens agree with those from Arizona, in usually lacking a geminate black stripe along dorsum.

LINOTÆNIA CHIONOPHILA (Wood)

? *Geophilus acuminatus* Leach, Trans. Linn. Soc. Lond., 1814, 11, p. 386.

Strigamia chionophila Wood, Journ. Phil. Acad. Sci., 1862, 5, p. 50.

Linotænia miuropus Chamberlin, Amer. Nat., 1902.

Scolioplanes acuminatus Attems, Arkiv for Zoologi, 1909, 5, No. 3, p. 25.

Linotænia chionophila Chamberlin, Can. Ent., 1911, p. 260.

Localities. Utah: Parowan, one male; Trout Creek, two specimens; Bear Lake, one male; Logan, many specimens.

All specimens examined have thirty-nine or forty-one pairs of legs, excepting one specimen from Logan Canyon, which seems also variant in other respects.

GNATHOMERIUM XENOPORUS (Chamberlin)

Localities. Utah: Parowan, Cedar City, Mill Creek Canyon, Logan Canyon. Many specimens.

This is evidently the most common geophilid in the canyons of Utah, where it is often abundant in leaf mold along streams. It occurs also in Colorado and New Mexico.

DIPLOPODA

PARAJULUS CANADENSIS (Newport)

Locality. Utah: Mill Creek Canyon. April. Two males.

This is a common species in eastern Canada and adjacent parts of the United States, but it has not previously been found west of the Rocky Mountains.

PARAJULUS TIGANUS Chamberlin

Localities. Utah: Mill Creek Canyon, Provo Canyon, Logan Canyon, and Bear Lake. Many specimens.

This is probably the commonest diplopod in the State. It has not been found as far south as Cedar City, however, where it seems to be largely replaced by *P. paiutus,* a new species here described.

Parajulus paiutus Chamberlin, sp. nov.

This is a smaller form than *P. tiganus.* The color is brownish with a row of black spots along each side, corresponding to the repugnatorial glands, and a median dorsal longitudinal black line. A geminate lighter band across dorsum between the lateral spots on each segment. Last segment darker, blackish. Legs yellow. Antennæ blackish. Distocaudal corner of cardo of mandible in male conspicuously produced, not excavated, the angle narrowly rounded. First legs thickened as usual, but less so than in *tiganus.* Gonopods of male of very different form from those of *tiganus,* being more like those of *P. nigrans.* Both lobes of anterior pair short; posterior lobe glabrous, narrower than anterior, a little bent forward distally. Posterior gonopods narrowed distally, a little curved caudad distally, the seminiferous duct opening at the caudally directed tip, much as in *nigrans.* Number of segments, 54. Length, male, 27 mm.

Localities. **Utah: Parowan,** nine specimens, in part not adult, taken in canyon above the town; Cedar City, four specimens also taken in canyon above town; and Zion National Park, one female.

Tylobolus utahensis Chamberlin, sp. nov.

A form more slender than usual in the genus, the length being ten times the thickness. Brown in color, the metazonites darker brown, with a tendency toward chestnut, the ectal caudal border paler. Repugnatorial glands showing as blackish spots on the sides, especially in the posterior region. Legs brown. Collum much narrowed at each end. Coxæ of third legs in male with the usual uncate processes, the immediately following coxæ also produced. Median plate of anterior gonopods of male distally pointed, much exceeded by the coxal plates, which are contiguous at middle and each of which at its mesal corner is produced ventrad. The telopodite is

somewhat enlarged at distal (mesal) end, but is only a little bent caudad at the end, not uncate. In the posterior gonopods the terminal hook or blade is smooth; at base of hook in the angle is a stout angular projection or tooth; the bent portion proximad of blade finely scabrous. Number of segments, 51-53. Length, 54 mm.; width, 5.2 mm. Female allotype, 7 mm. thick.

Locality. **Utah: Zion National Park.** Five adult males, two adult females, and two young specimens.

NANNOLE UTA (Chamberlin)

Locality. Utah: Little Willow Canyon.

DIPLOIULUS LUSCUS (Meinert)

Locality. Utah: Mill Creek.

Many specimens were taken on cultivated ground below mouth of the canyon. The species is now not uncommon in other places near Salt Lake City. A native of Europe, it is frequently brought to this country in soil about the roots of plants from Holland and other European countries. It long ago became established in the Eastern States and has now extended its range to California. It occurs only in settled or cultivated districts.

Scytonotus orthodox Chamberlin, sp. nov.

General color brown, in part of a weakly reddish tinge. Legs yellow. The second tergite bearing four well-developed series of tubercles; the anterior corners of keels produced along ends of collum, acute; lateral crenuations weak, with a translucent margin. In tergites of the middle region of body a transverse sulcus distinctly marked, behind the sulcus with three or in part four rows of well-developed tubercles, but in front of the sulcus the tubercles are low and are in part obliterated. Prozonites nearly smooth, the granules numerous, but very small or obscure. Distinguishable in structure of the male gonopods; the two blades equal in length, rather slender, the posterior one bidentate apically on caudal side, the teeth acute; anterior branch apically acute, with caudal margin straight and anterior convex. Gonopods very similar to those of *S. amandus;* but in the latter the branches are unequal, the dentate one being obviously shorter and its teeth closer together.

Localities. **Utah: Logan Canyon,** five adult males and three partly grown specimens; Bear Lake, about eighteen specimens, male and female, with some immature.

The young specimens do not show any reduction of the tubercles in front of the suture.

Spirostrephon utorum Chamberlin, sp. nov.

The color is light yellowish brown without distinct markings. Be-

tween the median keel and the thickened porigerous keel on each side of a typical segment there are three major setigerous keels, with a much lower non-setigerous keel between each two major ones; the porigerous keel much higher than these more mesal keels and its margin conspicuously convex in profile instead of nearly straight; below each porigerous keel two somewhat similarly high setigerous keels with a low, non-setigerous keel between these and one above the upper one; below on the side other non-setigerous keels which become lower in going ventrad. The major keels in profile are seen to be serrate or dentate. Number of segments, sixty.

Locality. **Utah: Green River.** One male. R. V. Chamberlin, Jr., collection 1920.

Apparently related to *S. mutans* of Southern California; but aside from more technical structural differences, it is conspicuously distinct in coloration and in the greater number of segments to the body.

Tingupa utahensis australis Chamberlin, subsp. nov.

In the absence of males a wholly certain determination of the position of this form is not possible. It agrees in general structure, the form and sculpturing of the tergites, etc., with typical *utahensis* from the northern part of the State, but it is a larger and more robust form. Color brown, the caudal border of metazonites paler, as is the prozonite in the constricting furrow adjacent to metazonite. Sixth and seventh articles of antennæ equal in length, the fifth much longer and distally slightly thicker than the sixth. The eye-patch is differently shaped, being trapeziform rather than triangular, with the dorsal side, rather than that along caudal margin, longest; ocelli in the holotype in six or seven vertical series instead of in four; e. g., beginning with most caudal row, 5, 4, 3, 2, 2, 1; and in four or five transverse, somewhat curving, series, e. g., beginning at top, 1, 7, 5, 3, 1. Length, about 9 mm.

Locality. **Cedar City, Utah.** One female taken in the canyon. May.

Underwoodia tida Chamberlin, sp. nov.

A much smaller form than *hespera,* differing superficially also in being distinctly paler in color on the sides below level of pores than on dorsum; finely mottled. Legs dusky yellow. Antennæ of same color as legs. Head dark above in frontal region with numerous fine, pale dots, clypeus yellow. Sixth joint of antennæ decidedly thicker and longer than the seventh. Ocelli in a triangular patch with apex mesad; thirteen in number, arranged in three or four oblique series, e. g., 6, 5, 2 or 1, 5, 5, 2. Collum not distinctly margined below. Length, 6 mm.

Locality. **Utah: Logan Canyon.**

Underwoodia hespera Chamberlin, sp. nov.

The body in general is brown, with the metazonites darker, light spots on each side indistinct. Head dark, black, or nearly so. Legs dusky over yellow or light brown, the antennæ blackish. In the antennæ the sixth article is narrower than the fifth and is obviously and considerably longer than the seventh instead of being equal to it, as is the rule in species of *Cleidogona.* Ocelli distinct; eighteen, in five somewhat irregular longitudinal series, as follows: 1, 2, 4, 5, 6; the patch triangular in outline, with the apex mesad in position. Body strongly narrowed anteriorly. Collum acutely narrowed down each side, margined anteriorly on each side, otherwise smooth. Segments in general smooth, not striate above, under lens seen to be evenly marked with areas defined by fine lines, the areas mostly from quadrate to oblong in form. Length, 8 mm.

Locality. **Utah: Mill Creek Canyon.** One female.

POLYDESMUS MONILICORNIS Koch

Locality. Mill Creek. One immature specimen, apparently this form, which is common in the Eastern States and Canada.

NOTES ON LOPHOCERAMICA ARTEGA BARNES (LEPID., PHALAENIDÆ)

BY WILLIAM BARNES AND F. H. BENJAMIN

Decatur, Illinois

LOPHOCERAMICA ARTEGA Barnes

1907, Barnes, Can. Ent., XXXIX, 64, *Tricholita.*

1908, Dyar, Proc. Ent. Soc. Wash., X, 32, *Lophoceramica.*

1912, Barnes & McDunnough, Contrib. N. H. Lep. N. A., I, (4), 21, pl. IX, f. 20; p. 55, pl. XXVI, f. 11, *Lophoceramica.*

pallicauda Sm.

1908, Smith, Ann. N. Y. Acad. Sci., XVIII (2), 101, *Mamestra.*

Lophoceramica artega form **eriopygoides** nov.

artega Auct. (nec Barnes).

1912, Barnes & McDunnough, Contrib. N. H. Lep. N. A., I, (4), 21, pl. IX, f. 19, p. 55, pl. XXVI, f. 10, *Lophoceramica.*

The form of *artega* lacking, or practically lacking, the white on the reniform appears to be causing some confusion, so we designate it as *eriopygoides.* It is a parallel development to *Chabuata endiva* form *vespera.*

Type localities and number and sexes of types: Holotype ♂, Paradise, Cochise County, Arizona, 1-7 July; allotype ♀, id., 1-7 June; 5 ♂ 2 ♀; paratypes, Paradise, Baboquivari Mountains, Palmerlee, and Patagonia, Arizona, June, August, September.

Note—In Barnes collection; a single female paratype in California Academy of Sciences, having been submitted for determination by Mr. E. P. Van Duzee.

A NEW PYRALID FROM CALIFORNIA, WITH NOTES ON DECATURIA PECTINALIS B. & McD. (LEPID., PYRALIDÆ, MACROTHECINÆ)

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

Macrotheca lecerfialis Barnes and Benjamin, sp. nov.

Ground color white; fore wing with a few scattered black scales; t. a. line black, single, waved from costa to inner margin; orbicular represented by a few black scales; reniform obsolete; t. p. line single, black, nearly erect, little waved, a trace of a blackish s. t. suffusion subapically; a terminal row of dots; fringe white, with a few black scales; hind wing only slightly darker than fore wing; discal spot and median shade obsolete; an obscure terminal line; fringe luteous-white basally, distally white. Expanse, 9-11 mm.

Allied to *bilinealis* and *flexinealis*. Lack of reniform will easily sort it from the latter, while its much paler coloring and more erect t. p. line will easily distinguish it from the former.

Type locality: Dixieland, Imperial County, California.

Number and sexes of types: Holotype ♂, 15-30 April, 1922; allotype ♀, 1-15 May, 1922; 8 ♂ paratypes, 15-30 April, 1922.

Note—We take pleasure in naming this species in favor of M. LeCerf, who extended every courtesy to the senior author during his stay in Paris.

Decaturia pectinalis B. & McD.

1912, Barnes & McDunnough, Contrib. N. H. Lep. N. A., I (5), 41, pl. III, f. 8, *Decaturia.*

In the original description of the genus and species the antennæ of the female is described as being simple. A series of females before us, including the type ♀ and four ♀ "Cotypes," proves this to be incorrect. The antennæ are decidedly strongly lamellate, as that term is applied in Lepidoptera: viz., dentate.

The type series bore no dates. Specimens have been received from the Baboquivari Mountains, Pima County, Arizona, April, May, June, September, and October; and from Clark County, Nevada, June.

NEW SPECIES OF CARABIDÆ IN THE SUBFAMILY HARPALINÆ, CHIEFLY FROM WESTERN NORTH AMERICA

BY EDWIN C. VAN DYKE

University of California, Berkeley, California

Bembidium cœrulescens Van Dyke, new species

Form moderately elongate, gracefully proportioned, slightly convex, shining, nigropiceous with a bluish luster above, especially on head and prothorax, the antennæ, palpi, tibiæ, and tarsi brownish. Head scarcely narrower than the prothorax at apex, alutaceous, eyes moderately prominent, antennæ slender, about one-half length of body, frontal grooves single, straight and shallow, mandibles prominent. Prothorax as wide as long, three-fourths as wide as elytra at base, narrower at base than apex; apex feebly emarginate; sides with the margins distinctly reflexed, moderately arcuate in front, gradually narrowed and sinuate posteriorly; hind angles slightly obtuse and not carinate; disc alutaceous with median longitudinal groove well impressed and abbreviated in front; anterior transverse impression well defined; area in front of it with a number of longitudinal rugæ; basal impressions broad, deep, indistinctly bistriate, the entire basal area rugose. Elytra elliptical, three-fifths as broad as long; humeri distinctly rounded; sides slightly arcuate anteriorly, more decidedly so posteriorly and but slightly sinuate in front of apex; disc finely striate, the striæ entire and with very vague punctures anteriorly, the outer ones less deeply impressed, the fifth terminating in a deep groove; third stria with first dorsal puncture slightly in front of the middle and second about one-fourth distant from apex; eighth stria at border of marginal groove, the intervals flat. Length, 7 mm.; breadth, 3 mm.

Holotype, male (No. 1818, Mus. Calif. Acad. Sci.), in my collection, kindly presented to me by Mr. Merton C. Lane, who secured it near the margin of the stream in **Niles Cañon, Alameda County, California,** December 27, 1919. Two paratypes captured at the same time are in Mr. Lane's collection.

This very graceful species looks not unlike a small specimen of *Platynus funebris* Lec. According to the arrangement of Roland Hayward,[1] it would have to be placed in his Group VII (*planatum*), and close to *funereum* Lec., though it is very much larger, almost as large, in fact, as *planatum* Lec. It resembles *nigrocœruleum* Hyd. only in color. It is also a more elegantly formed insect than any other in the group.

1 "On the Species of Bembidium of America North of Mexico," by Roland Hayward. Trans. Am. Ent. Soc., Vol. XXIV (1897), pp. 32-143.

Bembidium utahensis Van Dyke, new species

Form elongate, depressed, color dark rufous. Head large, but slightly narrower than the prothorax; eyes small and much flattened, hardly extending beyond the sides of the head; antennæ stout, reaching but two segments beyond the humeri; frontal impressions single, shallow and lunate; mandibles prominent, porrect; palpi rufocastaneous, the terminal joint of the maxillary palpi at least twice as long as the similar joint in *Bembidium laticeps* Lec. Prothorax almost a third broader than long, narrower than elytra at humeri; apex feebly emarginate; base just perceptibly arcuate; sides moderately arcuate in front, sinuate posteriorly and parallel for a short distance in front of base; hind angles right; lateral margin narrow; disc barely convex; median longitudinal groove well impressed, especially posteriorly, and almost completely; anterior and posterior transverse impressions obsolete; basal impressions deep, with double striæ vaguely defined, most of the basal area somewhat rugose. Elytra elliptical, somewhat more than a third longer than broad; humeri rounded but with prominent basal ridge running obliquely inwards, the margin fine; disc somewhat flattened, all striæ present, well impressed near suture, less defined laterally and apically, and finely punctate; third stria with two dorsal punctures, the first slightly in front of the middle, the second somewhat more than a fourth of the distance from apex; eighth stria in marginal groove. Length, 4.5 mm.; breadth, 2 mm.

Holotype, male (No. 1819, Mus. Calif. Acad. Sci.), in my collection, secured near **Salt Lake City, Utah,** by Professor R. P. Chamberlin, and kindly presented to me by Dr. William M. Mann. A second specimen was in the collection of Dr. Mann.

This beetle has its closest relative in *Bembidium laticeps* Lec. and belongs with that and *Bembidium puritanum* Hyd. It differs from the former by being larger with the prothorax more elongate and less broad, the elytra also more elongate, with all of the striæ well defined and finely punctured, whereas in the other the striæ are but vaguely defined. It is interesting to find the third member of this small group near Great Salt Lake, *laticeps* being found near the seashore in southern California and *puritanum* in Massachusetts.

Trechus ruficollis Van Dyke, new species

Body rather stout and somewhat convex, shining, rufopiceous; head and prothorax rufous; antennæ, palpi, legs and epipleuræ castaneous. Head more than three-fourths as wide as prothorax; eyes moderately prominent; frontal sulci long, deep and semi-circular; antennæ moderately slender, segments definitely broadened out-

wardly, extending to second fourth of elytra. Prothorax small, not quite twice as wide as long; sides moderately arcuate anteriorly, sinuate posteriorly and straight and parallel near base; hind angles prominent and right, the lateral margin moderately reflexed; disc with the median longitudinal groove finely impressed, the anterior transverse impression vague, the posterior pronounced even at middle, the basal impressions moderately deep and diffuse. Elytra oval, somewhat truncate at base, almost twice as wide as prothorax and two-thirds as wide as long; disc with the three inner striæ very fine, though observable and complete and with slight indications of a fourth stria; third stria with three foveæ, the first one-fifth distant from base, the second at about the middle, and the third close to the apex. Length, 3.5 mm.; breadth, 1.75 mm.

Holotype and three paratypes, bearing the label, **Lawrence, Massachusetts,** found among a series of unplaced specimens in the entomological collection of Cornell University. They were part of the Crew collection. The holotype and one paratype will be deposited at Cornell University, and the two remaining paratypes will remain with me.

This species belongs in the series with *arizonæ* Casey, *hydropicus* Horn, *ovipennis* Mots., and *pomonæ* Fall, agreeing with all in the general form and degree of smoothness. It, however, differs from all by having shorter and heavier antennæ, the prothorax more decidedly sinuate posteriorly, approached slightly in this regard by *arizonæ* Casey, the hind angles more prominent, and by being bicolored, the rufous prothorax, in all specimens seen, strongly contrasting with the piceous elytra. It is possible that, in spite of the definite locality label, these specimens may have come from some other locality, for it seems strange that such a well-marked species should occur in Massachusetts and remain unknown so long. It does not seem to agree with any of the European species and, as stated, bears a strong resemblance to certain American species.

Patroboidea Van Dyke, new genus

Body very elongate, parallel and flattened. Head large, elongate, genæ prominent and long, reaching from the posterior margin of the eyes to the antennæ, head constricted posteriorly, with deep and broad frontal grooves and two supra-orbital setæ, one rather inconspicuous. Antennæ long, reaching to posterior third of body, moderately stout, arising under a feeble frontal ridge; first and second segments glabrous, the following fairly pilose; first robust, second small and transverse, third long, as long as the two following united and about five times as long as the second; segments three to six of

about equal length and breadth, seven to ten also of about equal length and breadth, but somewhat shorter than the preceding, the eleventh about as long as the third. Eyes poorly developed, projecting but little beyond sides of head, well removed from the mouth. Clypeus well developed, transversely depressed in front and with lateral setæ. Labrum short, broadly shallowly emarginate and plurisetose in front. Mandibles prominent, prognathous, feebly arcuate, acute and curved at tip, with setigerous puncture in scrobe. Maxillæ slender, acute at tip, ciliate with stiff hairs on inner side, the outer lobe biarticulate; palpi rather long, the terminal segment gradually tapering to apex, slightly longer than preceding, the point subacute; penultimate not hairy. Submentum broad, its basal suture distinct, deeply emarginate and with broad truncate lobe at middle; epilobes dentiform; ligula moderately prominent, rounded and bisetose at apex; paraglossæ broad, rounded at apex and very little longer than the ligula; palpi of moderate length, the terminal segment conical, somewhat blunt at apex and slightly longer than preceding segment.

Prothorax flattened, with side margin narrow and with setigerous punctures near the front and at hind angles. Body not pedunculate, scutellum distinct. Elytra flattened, elongated, more or less elliptical, not margined at base; sides narrowly inflexed; margin posteriorly entire and without internal plica; disc with nine complete striæ, counting the marginal; first and second and the third and fourth united at the apex; third with three dorsal punctures, the first one-fourth distant from base, the second at about the middle, and the third one-fourth distant from apex. Prosternum moderately separating the coxæ and declivous at apex. Mesosternum narrowly separating the coxæ. Metasternum long, the epimeron short, the posterior coxæ contiguous. Anterior tibia of the male somewhat angulated, the emargination deep and about one-third distant from apex; tarsi slightly dilated and squamose beneath.

Genotype, *Patroboidea rufa* Van Dyke, new species.

This genus, without doubt, belongs in the tribe Pogonini, as defined by Horn,[2] and in the first of his groups, the group Pogoni. It belongs near the genus *Patrobus*, and in general has much the appearance of the flatter members of that genus, those classed as *Platidius* by Chaudoir, but it is much smaller than any of the species included within that, and in fact looks much like the European *Thalassophilus longicornis* Sturm. With this last, it agrees as regards general size, shape and color, small eyes, and heavy and long antennæ, but it differs in lacking the basal striæ of the elytra and in having a very small second

[2] "On the genera of Carabidæ, with special reference to the fauna of Boreal America," by George H. Horn, M. D., Trans. Am. Ent. Soc., Vol. IX (1881-82), p. 135.

segment and very long third segment to the antennæ, in this last regard resembling *Pogonus*. From *Pogonus*, it differs primarily in having the genæ well developed and elongated, the constriction of the head, therefore, not just back of the eyes but far removed, in having the eyes poorly developed and the palpi, both maxillary and labial, quite long and slender and subacute at apex, in contrast to the truncated palpi of the other.

Patroboidea rufa Van Dyke, new species

Elongate, quite parallel, much flattened, rufous, head somewhat darkened. Head elongated, somewhat elliptical, smooth, impunctate; frontal impressions deep, straight, extending back as far as eyes; mandibles long, porrect, and but little curved except at apex; eyes small, projecting but little beyond sides of head; antennæ rather stout, long, extending to beyond middle of elytra. Prothorax slightly broader than long and about as long as head, including mandibles; base narrower than apex; apex slightly emarginate; base truncate; sides moderately arcuate in front, sinuate posteriorly, the hind angles prominent and right-angled; disc flattened, smooth, with median longitudinal groove deep and complete, anterior transverse impression vague, the posterior mainly indicated by a series of well marked punctures, the basal impressions deep and broad posteriorly. Elytra slightly longer than head and prothorax combined, about one-third wider than prothorax, base emarginate, the humeri rounded; sides almost parallel, but slightly arcuate; disc flattened; striæ well defined, complete and with but a few indistinct punctures near base; scutellar striæ fine. Body beneath smooth and shining. Length, 5.5 mm.; breadth, 2.25 mm.

Holotype, male (No. 1820, Mus. Calif. Acad. Sci.), in my collection, taken by myself from beneath a piece of driftwood on the sandy beach along the Snohomish River near **Monroe, Washington,** July 4-14, 1905. A second specimen, which I have designated as a paratype, was collected along Spious Creek, British Columbia, May 30, 1921, by Mr. Ralph Hopping, and is now in his collection.

PTEROSTICHUS BRUNNEUS Dej.

This species, about which there has long been much confusion, due chiefly to the fact that neither Leconte [3] nor Horn knew the species, is well defined by both Dejean [4] and Manner-

[3] "The Pterostichi of the United States," by John L. LeConte, Proc. Acad. Nat. Sci., Phil., 1861, p. 312. The specimen, sent to Dr. LeConte by Chaudoir as the type of *Pterostichus brunneus* Dej., could not have been that, but probably a specimen of *Pterostichus castaneus* Dej. Chaudoir himself later insisted that *brunneus* and *castaneus* were quite distinct.

[4] "Species General des Coleopteres," by M. le Compte Dejean.

heim,[5] and is easily recognized once we compare typical specimens with the original description. It was described from Sitka, but is a common species on the islands off the coast of southeastern Alaska and on Orcus Island in Puget Sound, as well as on the Selkirk Mountains of British Columbia and the Cascades of Washington and Oregon, at least as far south as Mt. Jefferson. In the northern Cascades it lives as does *Pterostichus protractus* Lec. in the Sierras, in the woods under old logs. Structurally, it is about midway between *castaneus,* which is generally to be found in the same environment with it, and *protractus,* and in fact if found in the Sierras would no doubt be taken for a small specimen of the latter. It is most decidedly not the same as *castaneus,* as stated by LeConte,[3] nor synonymous with *scutellaris,* as given by Horn.[6] *Pterostichus scutellaris* Lec. is nothing more than a fully pigmented or melanotic offshoot of *amethystinus.* This last, a common species of the dense forests of the Pacific Northwest, extends into California and along the coast only so far as northern Sonoma County, where *scutellaris* takes its place, and continues on to Monterey County. There seems to be a distinct cleavage between the two species, and the fact that in ancient times a gulf existed at about the place where one replaces the other might account for this.

Pterostichus nigrocæruleus Van Dyke, new species

Moderately elongate, somewhat flattened, gracefully proportioned, head and pronotum shining black, elytra violet to bluish black, antennæ, legs and under surface piceous to rufopiceous. Head rather large, almost two-thirds breadth of prothorax, very smooth and shining, frontal grooves long and well impressed; the mandibles prominent and noticeably hooked at apex; eyes moderately prominent; antennæ slender, extending several segments behind the base of the prothorax. Prothorax slightly wider than long, anterior angles prominent, sides broadly arcuate anteriorly, sinuate posteriorly, hind angles right-angled; lateral margin broad and reflexed; disc slightly convex, very smooth and shining, median longitudinal groove deep, the anterior and posterior transverse impressions distinct; basal impressions single, long and deep, the basal area external to these flattened, not margined, and slightly reflexed in a wing-like manner. Elytra nearly two-fifths longer than head and prothorax combined,

5 "Beitrag zur Kafer-Fauna der Aleutischen Inseln, der Insel Sitkha und Neu-Californiens," by Graf. C. G. Mannerheim, Bul. Moscow, Vol. XVI (1843), p. 201.

6 "Random Studies in North American Coleoptera," by George H. Horn, Trans. Am. Ent. Soc., Vol. XIX (1892), p. 41.

four-sevenths as broad as long, at least 1 mm. broader than prothorax, elliptical; humeri well rounded and humeral angles not dentiform; disc slightly convex; striæ deep and simple, the intervals convex, without foveæ and very shining; scutellar stria vague, punctiform, at base of first stria. Legs slender, first three segments of posterior tarsi deeply grooved on outer side, posterior trochanters over one-third length of femora. Apex of prosternum not evidently margined. Beneath moderately smooth and shining. Length, 12 mm.; breadth, 4.5 mm.

Holotype, male (No. 1821), allotype, female (No. 1822, Mus. Calif. Acad. Sci.), and several paratypes, in my collection, captured by myself along the sides of a mountain stream back of **Port Angeles, Washington,** May 26, 1907. Paratypes will be deposited in the United States National Museum. In addition, I have used for comparison over fifty more specimens in my collection, which I collected at the following localities: The Forks, Clallam County, Washington; Marys Peak, Benton County, Marshfield, Olney near Astoria, and Waldport, Oregon; and from near the Van Duzen River, Humboldt County, California.

This elegant and beautiful species at first glance might be confused with *Pterostichus amethystinus* (Mann.), for it is of about the size of the normal individuals of the latter, is of somewhat similar color, and is to be found in the same territory. Structurally, it is widely separated, much more brilliant, with the head larger, the prothorax much broader, with the basal impressions single, long and deep, and the posterior angles much more prominent; the elytra elliptical, not parallel sided, the humeri well rounded and without having the humeral angles at all dentiform; the intervals distinctly convex throughout, and the apex of the prosternum not margined behind. Though a member of the subgenus *Hypherpes,* to which belong all those American species without discal elytral foveæ, it stands by itself. In habits, it is only approached by one other member of the subgenus, *crenicollis,* for it lives along the gravelly margins of the small densely shaded streams which come down from the hills. *Pterostichus amethystinus* (Mann.) and its close relative, *Pterostichus scutellaris* Lec., are to be found only in the damp woods in or under old logs.

Pterostichus beyeri Van Dyke, new species

Elongate, subparallel, slightly convex, rufopiceous. Head large, but .5 mm. narrower than prothorax and about as long, frontal

grooves distinct though not prominent; eyes small and flattened; genæ bulbous, invading much of the ocular area; mandibles long and but slightly curved, prognathous; antennæ moderately stout, slightly enlarged apically, about reaching to hind angles of prothorax. Prothorax slightly longer than broad, narrowed posteriorly, apex feebly emarginate; base transverse, slightly more than one-third of the greatest width of prothorax; sides feebly arcuate and convergent backwards almost to hind angles where they become sinuate; hind angles small, bluntly right-angled, lateral margins fine; disc feebly convex, the median longitudinal groove vague, the posterior lacking; basal impressions single, broadly though shallowly impressed, the basal margin only evident close to angles. Elytra slightly longer than head and prothorax combined, barely 5 mm. broader than prothorax, elongate elliptical; humeri distinct, humeral angles not dentiform; disc slightly convex, the striæ well impressed, simple and complete, the intervals slightly convex, a bit flattened apically and without dorsal foveæ; scutellar stria distinct, short and within base of first interval. Legs rather slender, anterior femora robust; posterior trochanters almost one-half length of femora and blunt at apex; first segment of hind tarsi vaguely grooved on outer side. Apex of prosternum not margined. Beneath moderately smooth and shining. Length, 12.5 mm.; breadth, 3.75 mm.

Holotype, male (No. 1823, Mus. Calif. Acad. Sci.), in my collection, captured in the **Bitter Root Mountains, Montana,** by Mr. Gustav Beyer and by him very kindly presented to me. One other specimen, in the Beyer collection, has been seen.

This species is somewhat related to *Pterostichus caligans* Horn. It is of the same length, but broader, with the prothorax and elytra proportionally shorter, as compared with the length, the eyes slightly larger, the humeral angles not dentiform, the hind femora not so clavate nor the posterior trochanters so long and apically narrowed, and the posterior tarsi not so definitely grooved externally. To *Pterostichus rostratus* Newm. it is even closer structurally, differing mainly by being smaller and less robust, with single basal prothoracic impression instead of double, and by having the elytral striæ simple. This places it as an intermediate species between the group to which *caligans* belongs and *rostratus*, and shows that the two genera, *Cylindrocharis*[7] and *Leptoferonia*,[7] established by Colonel Casey upon insufficient characters, should be suppressed. In this connection, I will also state that *Hyperphes* Chaud. is a well-defined subgenus of *Pterostichus* and should include, not only those

7 "Memoirs on the Coleoptera," VIII (1918), by Thomas L. Casey, Lancaster, Penn., pp. 326 and 336.

species listed under *Pterostichus* in the Leng Catalogue, but also those included under *Hammatomerus* Chaud., *Holciophorus* Lec., *Cylindrocharis* Casey, and *Leptoferonia* Casey. The characters which are used to separate these are divergent ones of minor degree, whereas those which all of the species possess in common are fundamental.

Pterostichus falli Van Dyke, new species

Elongate, subparallel, slightly convex, rufous. Head large, .75 mm. narrower than prothorax and almost as long; frontal grooves distinct; eyes rather small; genæ bulbous and about as prominent as eyes; mandibles long and but slightly curved, prognathous; antennæ moderately stout, distinctly enlarged apically, reaching a little beyond basal angles of prothorax. Prothorax as long as broad, narrowed posteriorly, apex feebly emarginate, anterior angles evident but not prominent; base feebly emarginate, one-third the greatest breadth of prothorax; sides feebly arcuate and convergent posteriorly, sinuate in front of hind angles, which are sharply right-angled; lateral margin fine; disc somewhat flattened, the median longitudinal groove clearly defined and almost reaching anterior and posterior margins; anterior transverse impression evident, the posterior a broad, shallow depression; basal impressions double, the inner distinct and of moderate length, the outer vague, small and close to hind angles; basal margin vague. Elytra equal in length to head and prothorax combined, slightly broader than prothorax; humeri distinct, the humeral angles vague; sides subparallel, but feebly arcuate; disc slightly convex, flattened at middle, striæ distinct and complete though finer apically, the intervals quite flattened and without dorsal foveæ; scutellar stria fine, over .5 mm. in length and at base of first stria. Legs rather slender, femora not greatly developed, posterior trochanters not one-half length of femora and blunt at apex; first segment of hind tarsi distinctly grooved on outer side. Apex of prosternum distinctly margined. Beneath moderately smooth and shining. Length, 11 mm.; breadth, 3.25 mm.

Holotype, male (No. 1824), and allotype, female (No. 1825, Mus. Calif. Acad. Sci.), in my collection, captured by myself in the cañons on the east side of the hills east of **Hollywood, Los Angeles County, California,** January 9 and 4, 1912. Besides these there are seven other specimens in my collection which I have designated as paratypes and which were collected at various times in the type locality. It is named in honor of my good friend, Mr. Henry C. Fall, who has contributed so much to the advancement of our knowledge of the Coleoptera of western North America.

This species belongs with *caligans* and *beyeri*. It is, however, smaller than either, more distinctly flattened, with the prothorax more narrowed posteriorly, with two evident basal thoracic impressions, and the apex of the prosternum distinctly margined.

Pterostichus termitiformis Van Dyke, new species

Elongate, flattened, rufous, antennæ, legs and under surface lighter. Head very large, as broad as prothorax and distinctly longer; front flattened; frontal grooves distinct, broadly though shallowly impressed; eyes small, flattened; genæ not bulbous; sides of head posterior to eyes slightly arcuate and convergent posteriorly; mandibles long and but slightly curved, prognathous; antennæ long, extending several segments beyond hind angles of prothorax and but slightly dilated apically. Prothorax as long as broad, cuneiform; apex evenly though shallowly arcuate; base moderately arcuate, its width almost one-half the greatest width of prothorax; sides feebly arcuate and convergent backwards, becoming slightly sinuate as they approach the hind angles, the latter right-angled; lateral margin fine; disc flattened, the median longitudinal groove distinctly defined at center, anterior transverse impression vague, the posterior shallowly impressed, basal impressions single, rather long and lunate, basal margin lacking. Elytra slightly longer than head and prothorax combined, almost 1 mm. broader than prothorax, elongate elliptical; humeri broadly rounded, without humeral angles; disc feebly convex, flattened at middle; striæ simple and deeply impressed basally, finer apically, the intervals flattened though approaching convexity near base, without dorsal foveæ; scutellar stria minute, punctiform, at base of second stria. Legs rather long and slender, femora not greatly developed, posterior trochanters not one-half length of femora and blunt at apex, the first and second segments of hind tarsi distinctly grooved on outer side. Apex of prosternum not margined. Beneath moderately smooth and shining. Length, 9.5 mm.; breadth, 3 mm.

Holotype, male (No. 1826), allotype, female (No. 1827, Mus. Calif. Acad. Sci.), and paratype male in my collection, captured by myself at **Marshfield, Oregon,** the first on June 11, 1914, the others on June 10, 1914. They were found beneath deeply imbedded logs in the woods.

This species is definitely allied to *caligans, beyeri,* and *falli.* It differs materially, though, in general appearance, proportionately larger head, and more delicate form generally. The non-bulbous genæ will also serve to distinguish this species from its associates. The large head and mandibles and small prothorax give it an appearance not unlike that of a soldier termite, a resemblance which has suggested the specific name.

The last three species described belong to a peculiar group or assemblage within the subgenus *Hyperphes* of *Pterostichus,* the members of which are characterized in the main by being somewhat elongate and cylindrical, with small eyes, long forward projecting mandibles, often large femora, especially well-developed posterior trochanters, and, in the more divergent forms, with the antennæ enlarged apically. These are all characters which are to be found among those Carabidæ which live a burrowing life, and such is the case with those under discussion, they being the most subterranean in their habits of the American species of this large genus. The California species are rarely found except during the winter or early spring months, being deep down in the ground during the dry summers, as is the case with many of our earth-dwelling insects. The greater portion of this group is at present restricted to the Pacific Coast, but it is, no doubt, a very ancient one which was at one time widely distributed over the more northern parts of North America during later Pliocene times. Because of their specialized habits they could not readily migrate, and hence were in great part exterminated during the Great Ice Age, the species which remain to us today being but the relicts and those which dwelt in territory that suffered but little from the effects of that age. To this group belong the following species: *grandiceps* Chaud. and *rostratus* Newm. from the Appalachian region in general; *beyeri* n. sp. and *elongatus* Schffr., from the northern Rocky Mountain region; *arizonicus* Schffr. from Arizona; and *inanis* Horn, *angustus* Dej., *longicollis* Lec., *fuchsi* Schffr., *caligans* Horn, *falli* n. sp., and *termitiformis* n. sp., from the Pacific Coast. *Cylindrocharis sulcatula* Casey and *piceata* Casey are absolute synonyms of *Pterostichus rostratus* Newm., the characters given for their separation being insufficient. Of the forms described by Colonel Casey under *Leptoferonia, crucialis* is but a weak phase of *angustus, pumilis* a slight variant of *longicollis, fugax* a synonym of *fuchsi, larvalis* and *humilis* practically the same and at most but a subspecies of *fuchsi,* the posterior prothoracic angles being slightly more evident, and *inopina* a weak variant of *ovicollis.* The species of this group, like all species which are to any degree subterranean, are unstable and plastic and thus inclined to vary

greatly, especially if they range over a great extent of territory, as do many of those mentioned above.

Pterostichus lanei Van Dyke, new species

Of moderate length and breadth, gracefully proportioned, black and shining, antennæ, mouthparts and legs rufopiceous. Head of normal proportions, two-thirds breadth of prothorax and one-third longer than broad, convex; frontal grooves distinct but not prominent; mandibles normal; eyes prominent; antennæ slender, extending several segments beyond apex of posterior prothoracic angles. Prothorax over one-sixth broader than long, distinctly narrowed posteriorly; apex distinctly emarginate, anterior angles moderately prominent; base but slightly emarginate at middle; sides broadly arcuate for anterior three-fourths, straight and convergent to posterior angles; hind angles obtuse, rather sharply defined; lateral margin fine and well reflexed; disc convex, median longitudinal groove clearly and rather deeply impressed, almost complete; anterior and posterior transverse impressions faintly defined; basal impressions single, deep and linear; a faint indication of a secondary impression at the sides of the broadened base of the preceding; the area close to the posterior angles somewhat flattened, thus making the angles more evident; base not margined. Elytra about one-sixth longer than head and prothorax combined, a third longer than broad, elliptical; humeri well rounded; disc convex; striæ complete, deeply and uniformly impressed, the faintest indication only of punctures; scutellar stria distinct and of moderate length, the intervals convex, the third with a distinct fovea just anterior to the middle, and a second midway between that and the apex. Legs slender, femora moderately developed, posterior trochanters rather large; first three hind tarsal segments distinctly grooved on outer side. Beneath rather smooth and shining. Length, 11 mm.; breadth, 4 mm.

Holotype, male (No. 1828, Mus. Calif. Acad. Sci.), in my collection, captured by Mr. Merton C. Lane at **Wawawai, Washington,** and kindly presented to me. Several paratypes are in Mr. Lane's collection.

This graceful black species is of about the size of some of the smaller specimens of *Pterostichus vicinus* Mann., and it somewhat suggests that, but is far less robust, with prothorax more narrowed posteriorly and humeri well rounded. Its structure would place it near *lachrymosus,* particularly the possession of two dorsal punctures and deep linear basal impressions to the prothorax, but it is not closely related to that nor to any of the species associated with that.

(To be continued)

REVISED CHECK-LIST OF THE SPECIES OF ELEODES INHABITING AMERICA, NORTH OF MEXICO, INCLUDING LOWER CALIFORNIA AND ADJACENT ISLANDS

BY F. E. BLAISDELL, SR.
San Francisco, California

The following revised list of the species of Eleodes inhabiting America north of Mexico also includes those from the islands in the Pacific, adjacent to the mainland and from the islands in the Gulf of California. This list is intended to replace the one given by Leng in the Catalogue of the Coleoptera of America, north of Mexico. References are given for the species and phases not given in the Leng Catalogue.

This list includes 106 species, 67 subspecies, and 12 varieties.

In my Monograph of the Eleodiini (Bulletin 63, United States National Museum) no attempt was made to designate subspecies. In the present list this has been done, based on more recent observations. My conception of subspecies and varieties or races has very recently been stated in the Proc. Calif. Acad. Sci., Ser. 4, Vol. XIV, No. 16, September, 1925. For information regarding forms and for synonyms, see my Monograph and Leng's Catalogue.

Eleodes coloradensis Blais. was first recorded as *humeralis* Lec. *forma tuberculo-muricata.*

Eleodes concinna Blais. was first considered as *humeralis* Lec. *forma granulato-muricata.*

Eleodes apprima Blais. was first given as *laticollis forma insularis.*

Eleodes immunda Blais. was first given as *hispilabris forma elongata.*

In all other cases where a form name has been raised to the rank of a variety or subspecies the name hereby validated has been marked as "new name" (n. n.).

The diagnoses of two new subspecies are here included so the names can be used in this list:

Eleodes horni fenyesi Blaisdell, new subspecies

Form quite similar to *horni,* but smaller, more slender, with the integuments more opaque; pronotal punctuation denser and more distinct; clypeal surface scarcely at all rugose, smooth and flat between the punctures.

Measurements (types). Length, 11 – 12.5 mm.; width, 4 – 5.5 mm.

Type locality. **Bishop, Inyo County, California.** Collected by Dr. A. Fenyes. Holotype, female, and allotype, male, in my collection. *Horni* occurs in Plumas County, California.

Eleodes manni sierra Blaisdell, new subspecies

Form somewhat larger and a little more robust than *manni;* humeri more strongly developed and moderately narrowly rounded; luster duller; pronotal punctuation much finer and equally as dense; sides of the prothorax more strongly sinuate before the basal angles, where they are parallel and straight for a short distance. In the female there are evident striæ of punctures on the elytra, in the male these are not as well marked.

Measurements (types). Length, 16.5 – 15 mm.; width, 5.5 – 5.6 mm.

Type locality. **Kings Cañon, Fresno County, California.** Collected on August 4, 1917.

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Genus ELEODES Esch.

Subgenus Melaneleodes Blais.

debilis Lec.
carbonaria Say
  subsp. soror Lec.
vicina Lec.
nitida Casey
ampla Blais.
obsoleta Say
  subsp. annectans Blais. n. n.
  subsp. porcata Casey.
mazatzalensis Blais., 1925, 379.
knausi Blais.
omissa Lec.
  subsp. pygmæa Blais.
  subsp. borealis Blais. n. n.
  subsp. peninsularis Blais.
parowana Blais., 1925, 374.
  subsp. mimica Blais., 1925, 375.
quadricollis Esch.
  subsp. lassenica Blais., 1925, 373.
  subsp. anthracina Blais.
  subsp. lustrans Blais.
cuneaticollis Casey

humeralis Lec.
reducta Blais., 1925, 377.
concinna Blais., 1925, 381.
coloradensis Blais., 1925, 380.
fuscipilosa Blais., 1925, 376.
rileyi Casey
tricostata Say
  var. asperata Lec.
pedinoides Lec.
neomexicana Blais.
speculicollis Blais., 1925, 382.
wenzeli Blais., 1925, 381.

Subgenus Litheleodes Blais.

arcuata Casey
extricata Say
  subsp. convexicollis Blais., n. n.
  subsp. cognata Hald.
  subsp. arizonensis Blais.
  subsp. utahensis Blais., 1921, 131.
granulata Lec.
  subsp. obtusa Lec.
  subsp. corvina Blais., 1921, 224.
papillosa Blais.
letcheri Blais.
vandykei Blais.
  var. parvula Blais.
  var. modificata Blais., 1921, 131.

Subgenus Tricheleodes Blais.

hirsuta Lec.
pilosa Horn
barbata Wickh.

Subgenus Pseudeleodes Blais.

granosa Lec.

Subgenus Promus Lec.

insularis Linell
  subsp. terricola Blais.
subnitens Lec.
goryi Sol.
  subsp. seriata Lec.
striolata Lec.
fusiformis Lec.
opaca Say

Subgenus Heteropromus Blais.

veterator Horn

Subgenus Eleodes Esch.

obscura Say
  subsp. dispersa Lec.
  subsp. sulcipennis Mann.
  subsp. glabriuscula Blais., 1925, 383.
acuta Say
suturalis Say
  var. texana Lec.
grandicollis Mann.
  subsp. valida Boh.
sanmartinensis Blais., 1921, 220.
  var. mœsta Blais., 1921, 221.
sponsa Lec.
hispilabris Say
  subsp. nupta Lec.
  subsp. attenuata Blais.
  subsp. connexa Lec.
    f. convexa, Leng Cat. 228.
  subsp. sculptilis Blais.
  subsp. imitabilis Blais.
  subsp. immunda Blais., n. n.
    f. elongata, Leng Cat. 228.
  subsp. composita Casey
subpinguis Blais.
gracilis Lec.
  subsp. distans Blais.
caudifera Lec.
longipilosa Horn
dentipes Esch.
  var. perpunctata Blais.
  subsp. elongata Blais.
  subsp. tularensis Blais., 1925, 386.
  subsp. montana Blais., 1925, 385.
  subsp. marinæ Blais., 1921, 218.
  subsp. confinis Blais.
  subsp. elegans Casey
  subsp. prominens Casey
  subsp. pertenuis Blais.
subcylindrica Casey
armata Lec.
  subsp. impotens Blais.
inepta Blais., 1925, 334.
militaris Horn
  subsp. femorata Lec.

loretensis Blais., 1923, 262.
vanduzeei Blais., 1923, 264.
morbosa Blais., 1925, 335.
acuticauda Lec.
  var. punctata Blais.
laticollis Lec.
  subsp. minor Blais. n. n.
  subsp. apprima Blais., 1921, 219.
eschscholtzi Sol.
  subsp. lucæ Lec.
mutilata Blais., 1921, 222.
inflata Blais., 1923, 261.
adumbrata Blais., 1925, 332.
discincta Blais., 1925, 333.
tenuipes Casey
wickhami Horn
ventricosa Lec.
  subsp. falli Blais.

Subgenus Blapylis Horn.

tibialis Blais.
snowi Blais.
lecontei Horn
tenebrosa Horn
  var. nana Blais.
inculta Lec.
  subsp. affinis Blais.
consobrina Lec.
scabripennis Lec.
blanchardi Blais.
neotomæ Blais.
fuchsi Blais.
horni Blais.
  subsp. fenyesi, new subsp.
  subsp. monticola Blais.
manni Blais.
  subsp. sierra, new subsp.
  subsp. dilaticollis Blais., 1925, 388.
  subsp. variolosa Blais.
parvicollis Esch.
  subsp. farralonica Blais. n. n.
  subsp. planata Esch.
  subsp. squalida Blais.
producta Mann.
  subsp. alticola Blais., 1925, 387.
  subsp. trita Blais.
  subsp. constricta Lec.
behri Grinnell
hoppingi Blais.
clavicornis Esch.
scabrosa Esch.
rotundipennis Lec.
  var. versatilis Blais., 1921, 217.
cordata Esch.
  subsp. horrida Blais.
  subsp. patruelis Blais.
    var. adulterina Blais.
    var. hybrida Blais.
    var. sublævis Blais. n. n.
pimelioides Mann.
nunenmacheri Blais.
  subsp. verrucula Blais.
brunnipes Casey
  subsp. brevisetosa Blais.
propinqua Blais.
caseyi Blais.

Subgenus Metablapylis Blais.

nigrina Lec.
  subsp. perlonga Blais.
  subsp. difformis Blais., 1925, 389.
dissimilis Blais.
  subsp. nevadensis Blais.
schwarzi Blais.

Subgenus Steneleodes Blais.

gigantea Mann.
  subsp. meridionalis Blais.
  subsp. gentilis Lec.
  subsp. estriata Casey
longicollis Lec.
innocens Lec.

Subgenus Discogenia Lec.

marginata Esch.
scabricula Lec.
  subsp. acutangula Blais., 1921, 225.

Genus NEOBAPHION Blais., 1925, 390.

planipennis Lec.

THE HYPERBOREUS GROUP OF HEPIALUS (LEPID., HEPIALIDÆ)

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

HEPIALUS ROSEICAPUT N. & D.

1893, Neumoegen & Dyar, Can. Ent., XXV, 125, *Hepialus.*
1894, Neumoegen & Dyar, Jour. N. Y. Ent. Soc., II, 169, *Hepialus.*
1895, Ottolengui, Ent. News, VI, 290, *Hepialus.*
1896, Dyar, Can. Ent., XXVIII, 176, *hyperboreus confusus, Hepialus.*
1903, Dyar, Bull. U. S. N. M., LII, 580, No. 6608b, *hyperboreus confusus, Hepialus.*
1911, McDunnough, Can. Ent., XLIII, 292, (? *matthewi*(!) ♀), *Hepialus.*
1917, Barnes & McDunnough, Check List, p. 197, No. 8488, *mathewi, Hepialus.*

‡ *hyperboreus* Auct. nec. Moesch.
1911, McDunnough, Can. Ent., XLIII, 290, *Hepialus.*

‡ *pulcher* Auct. nec Grt.
1911, McDunnough, Can. Ent., XLIII, 291, *Hepialus.*

Described from a single specimen from the Cascade Range near Lytton, B. C. The type is a ♀ ; not a male, as stated in the original description (1893) and by Ottolengui (1895).

Dyar (1896 and 1903) sinks the name to *confusus;* McDunnough (1911) thought it ♀ *mathewi;* and Barnes & McDunnough (1917) sink it to *mathewi;* but apparently lack of sufficient material in the past was prohibitive to properly sort the various forms allied to *hyperboreus.* This lack of material, coupled with misdeterminations on the part of all authors, has led to a very general confusion of the names in the group. Some authors appear to desire to call all American species synonyms of the European *H. ganna.* Judging from several figures, this species is nearest to *mcglashani,* but we think entirely distinct.

Both authors have independently examined all types involved except *hyperboreus,* which is unknown to us except from the literature and Moeschler's figure of type (1862, Wien. Ent. Monat., VI, pl. I, f. 1), and *pulcher,* of which we possess specimens agreeing well with Grote's figure of type (1864, Proc. Ent. Soc. Phila., III, 522, pl. V, f. 3).[1]

A resumé of the species in key form may assist to sort them. We are inclined to think that each name so far proposed represents a distinct species. *H. roseicaput* is the Mt. Hood spe-

1 Since writing the above we have received a photograph of type *pulcher* through the courtesy of Dr. H. Skinner.

cies, alternately called *hyperboreus* and *pulcher* by McDunnough (1911). Normally, it appears to be sexually dimorphic, the type agreeing with three out of our five females. Another female shows silver markings as in the male, and we call this form **mutatus** nov. We have a single female, with immaculate primaries, and we are calling this **demutatus** nov. Our series of 12 ♂, 5 ♀ were taken by McDunnough on Mt. Hood, Oregon, 8-15 August. We know *confusus* only from the type (♀) in the Bolter collection from Sitka, Alaska, and a female from "Metlakatla, B. C., August 21, 1903, Rev. J. F. Keen," in the Barnes collection. *H. pulcher* is known to us from 1 ♂, Glenwood Springs, Colorado, 16-23 August, and 2 ♂ "Utah." *H. mcglashani* is represented in the Barnes collection by 2 ♂, 1 ♀ from unknown localities, 1 ♂ labeled "Nev." (which may mean Sierra Nevada or Truckee, California), and a ♂ ♀ from Placer County, California. *H. mathewi* is represented by a series of sixteen specimens, both sexes, from Duncans and Victoria, B. C., from Messrs. Blackmore and Hanham. All specimens except one are dated, and the dates range from the 15th to the 29th of September.

Hepialus novigannus Barnes & Benjamin, n. sp.

A series of 21 ♂, 17 ♀ are in the Barnes collection from **Hymers, Ontario,** dates ranging from August 8 to September 15. In general all specimens are similar in size and in shade of ground color to *mcglashani,* but the silver markings are much cleaner cut and entire; aside from the normal V connected to the wing base, these are restricted to one or two spots below vein 1, some slight markings in the costal region, and a tendency toward dots along the outer margin, which, in even the best marked specimens, are obsolescent. No tendency toward sexual dimorphism. A dusk-flying species.

Hepialus novigannus mackiei Barnes & Benjamin, race nov.

Another series of 11 ♂, 12 ♀ from **Edmonton, Alta.** (D. Mackie) and 1 ♂, 2 ♀ from Calgary, Alta. (Dod?) appear to represent an insect at least racially distinct. Size and silver markings as in the preceding. While all of the other species before us do not vary greatly, except *mathewi,* the present form, while possessing uniform maculation in both sexes, varies surprisingly in color, ranging from deep brown to salmon-pink. In the event the present insect should ultimately prove consubspecific with the Ontario species, we are restricting our types to

5 ♂, 5 ♀ which show the salmon-colored primaries. The Edmonton specimens range in dates from the 24th of August to the 11th of September. Only one Calgary specimen is dated, "16-23 Aug."

Superficial key to the species and forms of the *hyperboreus* group of *Hepialus*.

I. Some silver or whitish markings on fore wings.

A. Conspicuous silver markings other than a broadly open V connected to wing base;

a. Fore wing with silver markings irregularly split into spots; hind wing marked by a fuscous band from apex to near wing base. (Labrador)..... *hyperboreus*

b. Not so; both characters not present in one species.

a.[1] Silver banding on fore wing, aside from a basal silver connecting dash, as a broadly open V not very irregular, although sometimes tending to split into spots, the other silver markings disconnected; hind wing with uniformly fuscous disc and disconcolorous pinkish fringes; usually sexually dimorphic; flying 1:30 to 3:30 p. m. in bright sunshine. (B. C.; Ore.)..... ♂ *roseicaput*, ♀ *roseicaput* form *mutatus*

b.[1] Silver banding on fore wing usually forming a V, but the V decidedly irregular, often with some silver tending to form a spur or spurs on the V, either subapically or near the base, the V seldom clean-cut except in some ♀♀; sexes similar; flying at dusk. (Calif.) ..... ♂ ♀ *mcglashani*

c.[1] Silver banding on (left) fore wing tending to form an oblique E, usually with an additional apical spur. When the E is broken into spots these spots are connected by black.

a.[2] Silver markings usually broken into numerous small spots connected by black; hind wing with uniformly fuscous disc. (Alaska; B. C.).... ♀ *confusus*

b.[2] Silver markings mainly contiguous; hind wing with salmon-colored disc, on which there is an irregular blackish suffusion. (Colo.; Utah)..... ♂ *pulcher*

B. Silver markings restricted to a broadly open V connected to wing base; except for one or two marks on or near

costa, the markings below vein 1, and obsolescent spots at base of fringes;

a. Fore wing usually with a black spot at the end of the cell, the apical portion of the silver V tending to become obsolescent or obsolete and usually replaced by black; hind wing basally more hairy than in other species, usually of some shade of luteous, salmon, or rufous, and usually marked by black. (Vanc. Is.) ..... ♂ ♀ *mathewi*

b. Forewing without black spot at the end of the cell; the apical portion of the silver V not tending to become obsolescent or to be replaced by black; hind wing less hairy than in the preceding, and usually smoother and less mottled-looking;

a.[1] Some shade of brown, often more or less slightly tinged with rufous; flying at dusk. (Ontario) ..... ♂ ♀ *novigannus*

b.[1] Color variable; types restricted to salmon-pink form. (Alberta.) ..... *novigannus* race (or form) *mackiei*

II. No silver or whitish markings.

A. Fore wing marked with more or less of a black V. (B. C.; Ore.) ..... ♀ *roseicaput*

B. Fore wing unmarked. (Ore.) .... ♀ *roseicaput* form *demutatus*

The Blaisdell Collection of Coleoptera

At the November meeting of the California Academy of Sciences, Dr. Barton Warren Evermann, Director of the Academy, announced that Dr. Frank E. Blaisdell, Sr., had presented to the Academy his entire collection of Coleoptera on the same terms under which the Van Dyke collection of Coleoptera was accepted by the Academy. Under these terms Dr. Blaisdell retains control of the collection during his lifetime, with the privilege of retaining any portions for study at home as he may require. When the Van Dyke and Blaisdell collections, which are comparable in size, are finally incorporated into the Academy collection, it will constitute a remarkably complete representation of the coleopterous fauna of the western United States, as well as an excellent general collection of beetles. These two collections supplement one another, so there is less duplication than one might expect. The Blaisdell collection is very complete in the Tenebrionidæ, Melyridæ and some other families, while the Van Dyke collection excels in the Carabidæ, Elateridæ, and certain groups of forests insects, such as the Buprestidæ and Cerambycidæ.—E. P. Van Duzee.

A NEW SPECIES OF LEPIDOSAPHES FROM CHINA (HEMIPTERA, COCCIDÆ[1])

BY JOSEPH CONRAD CHAMBERLIN

Citrus Experiment Station, Riverside, California

The species of *Lepidosaphes,* described below, is very similar in general appearance to *L. beckii,* the purple scale, with which it was originally confused. Morphologically, it is clearly distinct therefrom, as shown below.

I am indebted to Mr. E. E. Green and Professor G. F. Ferris for confirming my opinion relative to its status as a new species. Mr. Green suggests that it is possibly the same as *L. euryæ* Kuwana, as described in the Proceedings California Academy of Sciences, Vol. III, p. 80. That description is inadequate, however, to permit an exact determination, and consequently this form is best regarded, for the present at least, as distinct.

Lepidosaphes chinensis Chamberlin, sp. nov.

Type host and locality. On "magnolia" from **Canton, China.** Collected by F. Silvestri, 1925.

Habit: Occurring on leaves and stem of host. Scale of female typical for the genus; dark reddish-brown, very similar in general appearance to *L. beckii,* the purple scale. Scale of male of the type common to the genus.

Morphological characteristics: Adult female (Figure 1). Length about 1.0 mm. Derm membranous throughout, except for pygidium and spur-like lateral projections of the abdominal segments; thorax distinctly separated from abdomen by a constriction; thorax divided midway by a distinct transverse crease; margin of abdominal segments distinctly projecting laterally, bearing gland-spines and numerous small ducts. There is a distinct transverse row of five or six large ducts immediately posterior to the posterior spiracles. On each abdominal spur and on the base of the pygidium there is a round, heavily chitinized boss or raised disc, five pairs in all. Pygidium (Figure 2) with two pairs of well-developed lobes; median pair well spaced, mesally notched, as a whole well rounded; second pair less prominent than mesal pair, distinctly bilobed. Between the mesal lobes is a simple pair of gland spines; between the mesal and second lobe is a pair of gland spines and a large submarginal pore; beyond the second lobe another pair of gland spines and two large submarginal pores; then two more spines and another pair of submarginal pores, and lastly two more gland spines and a single submarginal pore. All submarginal pores with conspicuous chitinous rims. Dorsal ducts smaller than marginal ducts, fairly numerous and

1 Paper No. 134, University of California, Graduate School of Tropical Agriculture and Citrus Experiment Station, Riverside, California.

arranged in two conspicuous bands, as shown in Figure 2. No ventral ducts. Circumgenital pores in five small groups of four to six pores each. Anal opening anterior to cephalic group of circumgenital pores.

From *L. beckii,* its nearest relative, *chinensis* may be distinguished by the fewer circumgenital pores and by the greater number of marginal chitinized bosses. In *beckii,* these bosses are found on the two anterior abdominal segments and the prepygidial segment only, three pairs in all.

The holotype is deposited in the collection of the Department of Entomology of the University of California Citrus Experiment Station. Paratypes are deposited in the Stanford University collection and in Mr. E. E. Green's collection. Type material in the United States National Museum.

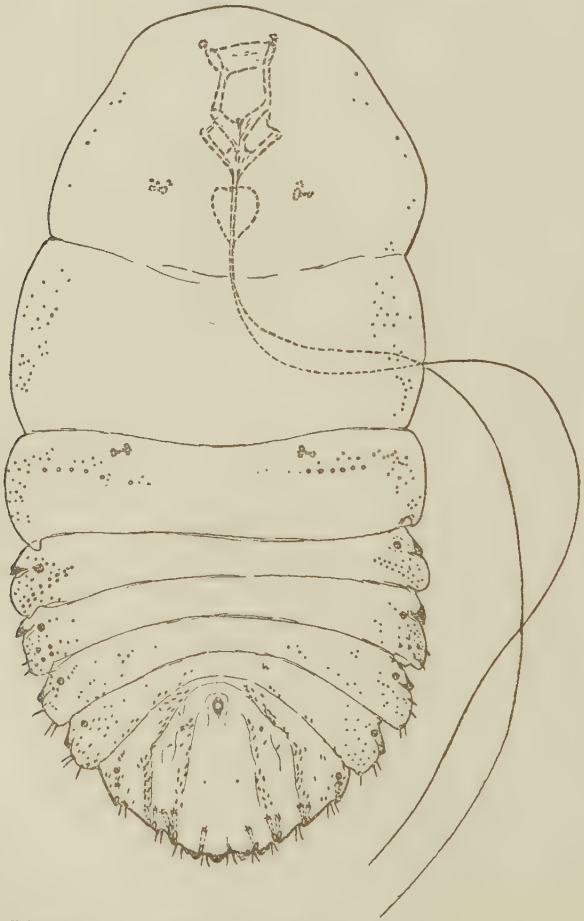

Figure 1. *Lepidosaphes chinensis* sp. nov. General aspect of adult female

Figure 2. *Lepidosaphes chinensis* sp. nov. Pygidium of adult female.

THE HATCHING OF THE EGGS OF PERIPSOCUS CALIFORNICUS BANKS

BY SIBYL WACHTER

Peripsocus californicus Banks is a species of the family Psocidæ (Corrodentia). It is commonly found on the leaves and bark of several species of garden shrubs and trees.

The eggs of this species are laid in masses of nine or ten on the underside of the leaves, beneath a silken web which is, as a rule, covered with a loosely woven canopy. Occasionally, the canopy is absent. Observed individuals have been seen to oviposit six masses of eggs within ten days' time, the laying of each mass covering a period of from twenty-four to forty-eight hours. The eggs hatch in from eight to ten days from the time of laying.

The first external indication of life in the eggs, as viewed under the binocular microscope, is the appearance of a black structure extending from the apex of the narrower anterior end of the transparent shell backward about a fifth of the length of the egg. It becomes very distinct the day before hatching. The immediate sign of hatching is the movement of this mechanism or egg-burster, followed practically simultaneously by the appearance of a bubble of air at its basal extremity.

Under the microscope the egg-burster appears as an elongated crescent-shaped saw, semi-circular at its basal extremity,

with the serrate edge extending from this point to its sharply pointed anterior end. The serrate edge indents one-third of its width. This mechanism is a part of the amnion, to which it is attached basally by strands of membrane slightly heavier than the rest of the amnion.

In this latter structural detail of the egg-burster we are able to verify a previous statement of Peyerinoff, who described a frontal chitinous organ consisting of a dentate ridge upon the amnion of a young psocid. We came to this conclusion from observing the amnion slip from the embryo as the body worked itself free, for as it contracted into a wrinkled mass at the opening of the chorion, the amnion carried with it the tiny saw, with the aid of which the embryo had attained its freedom. Furthermore, after dissecting the embryo from the chorion when it was about to hatch, we were able to slip the embryo out of the amnion, the egg-burster remaining as a part of the amnion.

In hatching, consecutive movements of the egg-burster increase gradually the extent of the area through which it works until it finally cuts through the chorion. Two or three movements are followed by a period of inactivity. In some instances these periods last five to ten minutes. At corresponding intervals bubbles of air may be seen passing into the œsophagus, where they increase in size and number as the process advances, and, passing down through the entire digestive tract, inflate the body. After a few movements of the egg-burster the basal end protrudes through the chorion, and at the break the edges wrinkle back as the opening increases. In the posterior region of the chorion deflation occurs, as though by the creation of a vacuum at that point, as the frontal area of the embryo breaks through and begins to push upward. At this time, which averages five minutes from the first signs of activity, bubbles of air enter the alimentary canal in rapid succession, some six or eight following each swing of the egg-burster. This now moves through a considerable area. The direction of movement is back and forth in the direction of the longitudinal axis of the egg.

Each proximal movement of the anterior extremity of the burster against the anterior extremity of the head of the embryo causes a very decided indentation at that point. This is followed by a distal movement of the burster upon which the

membrane resumes its previous turgid condition. There is apparently a direct relation between the movements of the burster and the accumulation of air in the digestive tract by means of which the embryo issues from its membranal envelope. This, then, would indicate an additional use of the burster. The amnion tears triangularly from the basal extremity of the burster toward its anterior extremity. The pressure exerted upon the inflated body by the proximal movement of the burster would thus seem to play some part in freeing the embryo. Previous references to the function or air and the use of the burster in the hatching of the Psocidæ have been reviewed by Knab.[1]

In emerging from the chorion the embryo takes barely a minute to attain an upright position. The body rotates continually in line with the position of the egg and soon bends forward, so that the burster is hidden from view. It is covered with the amnion and presents a smooth transparent appearance with distinct black eye-spots, which appear soon after emergence. The interior is still filled with air bubbles. As the anterior end bends forward and down, almost touching the chorion, the amnion snaps off, splitting just below the eyes, and is thrown off by pressure from within, a part of it remaining as a wrinkled mass at the split in the chorion and a part extending backward from the burster in the form of a minute triangle. The body of the insect now straightens out, the constriction between the head and thorax becomes evident, the legs are raised and begin to move with considerable rapidity toward and away from the body, and the palps and antennæ are gently waved. The slipping off of the amnion from the time the body bends over to the time of the freedom of the appendages, and backward movement of the body into an upright position averages three minutes. The entire hatching period of the egg varies from twenty to forty minutes. Its length seems to be determined largely by the duration of the intervals of inactivity of the burster and the time needed to accumulate air bubbles in the first stages of hatching.

After moving the appendages up and down for a few moments, the insect moves forward to rest lightly on its delicate legs, and finally walks away from the egg mass. It remains quite inactive for a time except for slight movements of the abdomen, in which the air bubbles are still visible. These gradually disappear. Five minutes later the psocid walks away and for several hours remains relatively inactive.

1 Knab, Frederick, The Role of Air in the Ecdysis of Insects. Proc. Ent. Soc., Wash., Vol. XI, 1909, 68-73.

THOMAS LINCOLN CASEY

BY FRANK E. BLAISDELL

Colonel Thomas Lincoln Casey, the well-known coleopterist, retired engineer of the United States Army, died at his residence in the Stoneleigh Apartments, Connecticut Avenue and L Streets, Washington, D. C., in the early morning of February 3, 1925, at the age of 67 years. He had been ailing and unable to attend to his entomological work for considerable time. The funeral services were conducted at his residence, and he was buried on February 6, in the Arlington Cemetery with full military honors.

Born at West Point, New York, Colonel Casey was the son of the late General Thomas Lincoln Casey and Mrs. Emma Weir Casey, and was the brother of Edward Pearce Casey, a noted architect.

Colonel Casey was a member of the Class of 1877 at Yale and was graduated from the United States Military Academy in 1879, and entered the Engineer Corps of the Army. He was promoted to the grade of first lieutenant in 1881 and of captain in July, 1888. He was made a major in 1898 and a lieutenant-colonel in 1906. He became a colonel in September, 1909. He married Miss Laura Welsh of Philadelphia in 1898.

During the Spanish-American War Colonel Casey was in charge of the defense of Hampton Roads, Virginia. He had also been at many stations, in charge of river and harbor improvements.

He had the distinction of having been an assistant astronomer under Professor Simon Newcomb on an expedition to Cape of Good Hope in 1882 to make a study of the planet Venus. He was a member of the Gree Company Commission to Texas in 1886 and of the Mississippi River Commission in 1902-1906. He also served on numerous other special boards, doing various kinds of engineering and scientific research. In 1904 he was in charge of the United States Engineering Exhibit at the St. Louis Exposition, and between the years 1906 and 1910 he was also an engineer and secretary of the lighthouse board. He was retired from active service in the Army in 1912.

Colonel Casey was a member of the New York Academy of Sciences, the Philadelphia Academy of Natural Sciences, American Society of Naturalists, the Washington Academy of

Sciences, Astronomical Society of the Pacific, the University and Century Clubs of New York and the Metropolitan, Army, Navy, and Chevy Chase Clubs of Washington, D. C.

Personally, I first began to correspond with Colonel Casey about 1890. My letter file yields a letter dated June 30, 1891. For several years I submitted material to him for identification, both while I was resident at San Diego and for the eight and a half years that I lived at Mokelumne Hill, Calaveras County. The results of my collecting can be traced through his writings. I had the pleasure of visiting him in Washington in 1909, while I was in that city indexing my Monograph on the Eleodiini. I called at his apartment in Stoneleigh Court and from there we went to his mother's residence at 1419 K Street, N. W. Washington. It was there that I examined a number of his types.

Colonel Casey was a most hospitable host. In conversation he told me that he worked but three hours a day. He explained how he arranged and studied the specimens and species before he began to write. He endeavored to be very careful in drawing up his descriptions, and he recorded the characters of the beetles as he saw and interpreted them, not always as we would have analyzed them—but, then, how many of us see things as others see them? Colonel Casey has opened up many lines of discussion regarding the question of species, subspecies, and forms. Time will prove whether or not his views are correct. At present it appears that time will work in his favor, if the recent studies in *Serica* and *Donacia* are any criteria. Critics had better remain conservative until more work has been done on the genital characters. Colonel Casey's decisions have been freely criticized. He has made many more mistakes than some other writers because he has done many times more work than they have. The works of Dr. George Horn yield as many errors, if his writings on the Tenebrionidæ can be taken as a criterion. Dr. Horn was too conservative and thereby retarded the science of taxonomy. Colonel Casey advanced taxonomy too rapidly. In spite of all this we are advancing sanely, and the best of us can only hope to add our mite to the grand total of the world's knowledge.

ECONOMIC NOTES

EDITED BY E. O. ESSIG
University of California, Berkeley, California

LEPTOGLOSSUS CLYPEALIS Heid.

The Yucca Flower Bug, *Leptoglossus clypealis* Heidemann, was taken in great numbers by the writer, in company with Dr. E. C. Van Dyke and F. H. Wymore, in the large flowers of Yucca, in the mountains of San Diego County on April 9, 1925. During the heat of midday the bugs were exceedingly active, and it was almost impossible to capture them, either with a net or by hand, because of the formidable sharp-pointed yucca leaves. Our company, however, secured quite a number of adults, after having received many painful jabs.—E. O. Essig.

ASH-LEAF BUG, NEOBORUS ILLITUS Van Duzee

This very pretty little yellow and black bug was reported in great numbers on Oregon Ash at Red Bluff, California, April 23, 1925.—E. O. Essig.

MISCELLANEOUS NOTES

Two species of Sparganothis (Tortricidæ) were reared from walnut husks at Saticoy, California.

The common stored products mite, *Tyroglyphus farinæ* DeGeer, has caused considerable damage to stored walnuts at San Bruno, California.

The caterpillar of *Zale norda* Smith injured blackberry vines at Saticoy, California, by feeding on the growing tips.

Phthorimæa sp. (probably *operculella* Zeller) was reared from larvæ found boring in tomato stalks in San Diego County.

Three specimens of an extremely pale form of *Carpocapsa pomonella* var. *simpsoni* Busck were reared at Saticoy, California.—S. E. Flanders.

GREAT ABUNDANCE OF CRICKETS IN THE SAN FRANCISCO BAY REGION

On several nights this last August, during a period of unusual humidity just preceding a storm, great numbers of the common field cricket were attracted to the lights in the various cities about San Francisco Bay. During the day the horde sought shelter wherever they could find it, and as a result congregated in the stores in such numbers that many of the merchants became much worried lest their goods be injured. This is the most numerous appearance of these insects in this territory of which I know.—Edwin C. Van Dyke.

FURTHER NOTES ON HUMAN SUFFERING CAUSED BY MITES, PEDICULOIDES VENTRICOSUS NEWP.

BY A. O. LARSON

Bureau of Entomology, United States Department of Agriculture

In an earlier article (Jour. Econ. Ent., Vol. 13, No. 3, p. 322) the writer described the effects of injuries which he received from the bites of the mites *Pediculoides ventricosus* Newp. while handling weevily beans and cowpeas. As he was handling these mite-infested seeds daily, it was impossible to determine how soon the characteristic dermatitis appeared after the bite had occurred, but he was of the opinion that the burning sensation began within a very short time. On a number of occasions the writer and co-workers have had minor attacks from these mites, but, owing to the nature of the work, they have usually been uncertain as to the time elapsing before discomfort became noticeable or before the appearance of reddened spots. They thought that discomfort came within a few minutes, and that the spots always appeared in less than twenty-four hours. They noticed a difference in susceptibility to the injury. On one occasion, when three persons were similarly exposed to the attack of mites, one who had red hair and a ruddy complexion was injured much worse than either of the others, while the writer showed very much less injury than the others.

In describing the effects of applications of these mites to various parts of the body, Dr. H. E. Ewing (Can. Ent., Vol. 54, No. 5, p. 108) says: "The appearance of reddened spots, each with a small papule in the center, was noted the day following application. These spots usually did not develop into wheals, but did itch considerably."

Since reading the above statements, the writer and co-workers, to their sorrow, have had another opportunity to get first-hand information. On Monday, September 15, a laborer, James Petersen, began sorting beans in the laboratory on a specially prepared table. He used as a stopper at the lower end of the table a small sample bag containing about one and one-half pounds of beans, to prevent the beans on the table

from rolling off while they were being examined. Some time during the day he substituted a larger bag filled with weevily cowpeas. Tuesday morning he said he had an "awful dose of hives" all over his arms and body. The peculiar thing about these hives was that none were located on his legs. After an examination I told him that his hives looked like mite bites. There were no mites in the beans he was examining, and I knew of no mites in the laboratory, but if mites had been crawling onto him from beans stored near by, they would have attacked his legs as well as his body. He was left alone on Tuesday, as he had been on Monday.

Wednesday morning, when I received word that he was unable to return to work, I began the work where he had left off, but as soon as I picked up the bag he had been using at the lower end of the table, I knew why he was not at work. This bag was filled with weevily cowpeas, which were badly infested with mites. He had used the bag, not only to keep the beans from rolling off the lower end of the table, but he had used it to wipe the dust off the table after removing each small lot of beans. The mites from the bag had thus been spread all over the table and had crawled onto his arms and body. His legs were not in contact with the table, and were uninjured.

After removing the bag of mite-infested cowpeas and making what I thought was a thorough cleaning of the table and surroundings, I went to see Mr. Petersen. His body and arms were a solid red blotch "burning like fire." He had first noticed this burning on Monday afternoon. It caused much discomfort during that night, but the addition of more mites on Tuesday made it almost unbearable. The external burning was supplemented by turns of fever followed by a cold sweat, making sleep impossible. As the writer, on previous occasions, had obtained relief by bathing in warm soapy water and then applying talcum powder, this treatment was recommended and immediately gave temporary relief. During the night he obtained little sleep between the several necessary applications of talcum powder. He was back at work Thursday morning.

On Wednesday morning I went over the table with a kerosene-soaked cloth to remove all mites after I had burned the mite-infested bag of cowpeas. During the afternoon the writer

and a co-laborer, Mr. C. K. Fisher, sorted beans on the table. In a short time Mr. Fisher was scratching where mites had bitten his arms and body, and before evening wheals had appeared. The writer, having an equal opportunity during the afternoon to become infested with mites which had remained in the cracks of the table, and a better opportunity to become infested in the forenoon while removing the infested bag of cowpeas and cleaning the table, first became aware of their ill-effects when he awoke at 5 a. m. on Thursday morning, scratching a few burning wheals on his body and arms. Mr. Fisher had not been in the laboratory since 7:30 a. m. the previous Saturday, consequently the bites caused wheals to appear on his body in less than three hours.

The table was again gone over with kerosene on Thursday morning and work was resumed, with no new attack of mites. At the end of a week the marks were plainly visible on the arms of Mr. Petersen and Mr. Fisher.

In this instance, as in the one cited above, not only was the writer injured much less than the other men, but a longer time elapsed before the injuries became visible, and their disappearance was more rapid. This indicates that different individuals may not react similarly either in the severity of the injury or the length of time required for the wheals and pustules to appear. It may suggest a tendency toward an acquired immunity to the effects normally produced by the first attack of the mites.

Where to Find Zacotus matthewsi Lec.

This brilliant purplish copper-colored carabid ranges from British Columbia to northern California and in the north as far east as the Bitter Root Mountains of Montana. It prefers damp situations, and in the humid lowlands is to be found in the woods under cover not far from streams or springs. It is here of a very brilliant copper color and rather hard to find because of the immense amount of cover. On the high Cascades, however, and the mountains of Idaho as well, as I am told by Mr. Merton C. Lane, it is to be found far more frequently. Here, close to timber line, where there is but little litter and the old logs rest upon hard ground, they are readily observed once the logs are turned over. The more alpine forms are also less robust, narrower, and less brilliant.—Edwin C. Van Dyke.

THE PAN-PACIFIC ENTOMOLOGIST
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Mr. Ralph Hopping, formerly an active member of the Pacific Coast Entomological Society, but now Forest Entomologist for the Province of British Columbia, stationed at Vernon, B. C., and Dr. J. M. Swain, Dominion Forest Entomologist at Ottawa, were welcome visitors at the Academy of Sciences in October. On their return from the South a week later, they were guests of honor at a special meeting of the Society, at which they gave an interesting account of the work in forest entomology being done in the Dominion of Canada.

Mr. Dudley Moulton, Horticultural Commissioner of the County of San Francisco, and well known as a careful student of the Thysanoptera, has prepared and is sending free to entomologists interested in collecting Thrips, a small "Thysanoptera Collecting Kit," containing vials, alcohol, a brush and memorandum sheets, and especially wishes to place them with entomologists in foreign countries. If you desire one of these collecting outfits, address Dudley Moulton, 244 California street, San Francisco, California.

Mr. J. C. Hamlin writes us that an official notice, under date of September 28, has been received from Mexico City, telling of the death of Professor José Mariá Gallegos, in the performance of his duty in Payo Obispo, Q. R., on September 23, 1925. Professor Gallegos was a versatile student of nature, his collecting showing a broad range of interest. His chief activities were, perhaps, centered in the birds, in which field he exhibited skill as a preparator rarely excelled, combined with a tireless energy. Much of his recent work had been directed toward a study of the fauna of the State of Lower California, and included work on the interesting insect fauna of that peninsula. Friends of Professor Gallegos will always remember him as a gentleman endowed with a most pleasing personality. He was a distinguished member of the Administration and of the Society of Biological Sciences of Mexico. Both of these institutions are most unfortunate in the loss of this worker in the prime of his life.